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AUTHOR Mead, Margaret
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ABSTRACT

Education may be looked at in terms of maintenance systems in which children are simply taught what adults know, maintenance and change systems in which provision is made for teaching children what their own parents do not know but which some adults know, and emergent systems in which children have to learn what no adult has ever learned in the same way. Most schools are still providing education consistent with the second system while, because of the new media and technology, emergent systems reflect the unique condition of today's world. We must recognize the inexperience of all adults in the contemporary world and institute new forms of learning together in which adults are educated in ways of identifying and using the world as seen through the eyes of children and teenagers. (SP)

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Age discrepancies in the understanding and use of modern technology, especially the mass media.

or

How parents and teachers fail to tune in on the children's media environment.

by Margaret Mead*

Education may be looked at in terms of maintenance systems in which children are simply taught what adults know - the system found in all primitive societies - maintenance and change systems, in which provision is made for teaching children what their own parents do not know but which some adults know - the system found in all societies with some provision for social mobility, or the absorption of immigrant groups - and emergent systems in which children have to learn what no adult has ever learned in the same way ... the unique condition which we face in today's world.

It is useful to have a clear picture of the earliest system in order to highlight the contrasts. Among hunting and gathering people, there are simple forms of the division of labor, boys learn men's skill and girls women's, and the entire society reinforces the learning process. The same tools are used generation after generation, the physical environment is known in detail, adults have gone through the same experiences that each generation of children go through, and children, as they learn, reinforce the memories and the understanding of their parents and grandparents. In slightly more complex

*Margaret Mead is curator of ethnology emeritus, American Museum of Natural History.
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societies there may be specialists and children and young people, in addition to learning what all members of their tribe know and what all members of their age and sex are learning, who may learn special forms of hunting or fishing or magical charms. The emphasis is more upon learning, not upon teaching, although occasionally a geneologist or the last man to command some special knowledge may seek for an apprentice heir. Societies differ in the efficiency of these methods of transmission; sometimes secrets are only imparted at the near death of one who knows them; sometimes a young person never learns about a particular way of handling some event - such as marrying a widow - unless he finds himself confronted with the event.. But in general such education, most of it completely informal, is remarkably efficient in transmitting the entire body of knowledge and learned behavior from one generation to another.

When we come to great civilizations, with division of labor, urban centers and rural **peasantry** conquest of alien peoples, emigration and loss of skills, and immigration and gains of skill or of a large number who need to be absorbed into the new society, we get the equivalent of schools of some sort. It is no longer possible to rely on transmission from parents and other adult members of the community, and there is a need for recruitment of new members of different groups, clerks, sailors, craftsmen, philosophers, from among the children of other groups, sometimes selectively. As knowledge spreads and new techniques are introduced into the society, like script, printing, systems of keeping accounts, navigation, engineering, more and more people have to learn what was developed by a very few innovators. The requirement for learning the language of those who control a large state is one

example of such a requirement, so as standard German, standard French and standard Italian became state languages, the people who had spoken dialects were required to learn to read and speak the standard language. The modern requirement of literacy that extends even to the most backward and isolated peoples is another example in which in one generation millions of people are required to learn a skill which was once confined to a very small number of adults and their children. Each such requirement introduces a generation gap but in the past the gap has been between many adults and their own children. Today the gap is between all adults and all children.

For we have entered into a new phase, which I am calling here emergent, in which change is so rapid that there is no time in which the first group of those who learn something new can teach their own children, who having learned something as children, can teach the same things as adults. Instead, the entire present generation of those who grew up before World War II, wherever they grew up, in New York or New Guinea, grew up in a world that was radically different from the world of today. Those born after the war have grown up in a world that is radically different from the pre-World War II world, and the links which used to bind the old and the new are missing. There are a few individuals who were reared in the extreme forefront of their own period, who understood, for example, thirty years ago what automation would mean, or that exploration of space was possible. But there are no adults alive today, in any country, born before World War II, who have had, or can ever have the kind of growing up experience of the post World War II generation. Those adults who do have a working comprehension of today's world are like

people who have successfully mastered a second language as adults. But for none of them are the ideas and the technology a mother tongue. These adults' second language is **their children's mother tongue, and because the changes are** worldwide, all the children have a new mother tongue.

This new world condition, in which children in the artic **fastnesses** of Alaska and the tropical **fastnesses** of south sea islands share, through tape recorder, radio and satellites, can be characterized broadly in the following terms: Today's children have learned, often not explicitly, but implicitly, the way children and non-literate people nevertheless know the grammar of their mother tongue, that we now have the means to destroy the entire population of this planet and that it will require constant vigilance to keep ~~them~~ from doing so; they know that the danger today is not that there will not be enough people to do the work or **defend** one's country, but instead that there is the danger of too many people who will choke the arteries of travel, exhaust the food supply, overwhelm today's institutions. They expect to hear about events as they happen and not after they happen, and therefore now relate to raw events rather than to history, as their literate predecessors did; they know that the adults who are their parents, and their teachers, do not seem to understand what is happening. Most of these adults still seem to think that nuclear war can be prevented for good by test bans, **non-proliferation treaties, and the destruction of stock piles and that other countries** **but** not their own should limit their population, that television is a nuisance **very** much inferior to reading, that exploration of space is an expensive and stupid luxury, that the way our enemies make war is bad but that when we do

the same thing this is good, that computers are some kind of mysterious monster - suitably implied by signs like the giant octupus painted on Brown University's new computer center - and that if only there were some kind of political leadership, more conservative or more radical, more socialism in capitalist countries, more freedom in communist countries, present day conditions which are thought of as being created by the mass media, or the Communists, or the Capitalist Imperialists, or the party in power or leader in power, would all be ironed out and the world would be something like it is imagined to have been before, with everybody working, people who knew their place and did not have unreasonable aspirations, airports and highways that were not crowded, air without smog, unpolluted rivers, clean beaches, innocent amusements and no crime or drugs, no riots or questioning university students.

Stated differently, most adults still believe that most of the changes which are transforming the world are due to some sort of moral or political misguidedness which could be corrected by political coercion, moral suasion or individual conversion. The young people, often at a very inarticulate level, know that the world has changed radically and irreversibly, because of the new technologies which have made scientific warfare a continuing possibility. They know that we have now explored the whole planet, and have established the fact that all men, regardless of racial divisions are members of the same species, have put the whole world into immediate communication and simultaneous confrontation of major events, and have begun the process by which machines will substitute not only for human hands but for the more laborious and long time and detailed operations of the human brain. They

know that computerization, automation, is not only here to stay but will proceed apace until the whole world has TV, that the protection of space and the inner space under the oceans will be as continuous a task as our present concern with borders and boundaries, and it will be cost, not time, that separates human beings on one place on the planet from those on another.

These are some of the large scale differences in the view of the world between the pre-war and the post war generations. But they effect everything that is taught and the reception that such teaching receives. Our history books are the carefully constructed and contrived versions of history which the peoples of a given period wish to convey to their children, worked over, pre-digested, highly selective. So are many of the mass media presentations, the big colossal spectacles, the great movie spectacles, the articles in Life and Look. These also are carefully edited to present particular points of view and a highly selective picture of reality. But just as a small town newspaper was once unable to distort the local news because everybody in town knew what had happened, children place the edited versions, the slow, ponderous, hopelessly out-of-date text books, some of which are as much as a generation out of date, and the more up-to-date, but also highly edited prepared versions of film, and TV beside the reality of the raw news which is poured in from all over the world. The editing is done in ways which no longer make sense; the basic premises both about what children should know and do know, are all wrong. They are given arithmetic text books which assume that they should spend 8 years learning arithmetic, while they can glimpse on TV, new math, new physics, the computations that control a satellite, the way in which a

computer predicts election results. They learn, from TV and from the ads which are seldom scrutinized for the same values as the textbooks and the **propagandistic** documents, just what is happening in the world, about the **pill and IUD and organ transplantation** and tissue propagation. They are learning about the possibility of test tube babies while the schools are still cautiously approaching a few carefully sterile remarks about reproduction.

They know about the processes of manufacture and have a new sense of what books mean. Very recently, all but the most highly educated people, regarded books as something given. There was the Bible, the almanac which told the truth about each year, the dictionary, the calendar. They had no idea that books were a place to turn to for something new, something just known, and little sense of how books were produced. But today, children writing to God, write: Dear God,

> Could you write more stories, We have already read all the ones you have and begin again. Emily
>
> Dear God,
>
> Church is alright but you could sure use better music. I hope this does not hurt your feelings. Can you write some new songs. Your friend, Barry.
>
> Dear God,
>
> Did you have as much trouble learning Hebrew as I do. Are there any easy ways to do it. I know you talk English too so, I am writing this in English. Respectfully Jerome.
>
> **Dear God,**
>
> **When you wrote the Bible you made up all the words and spelled them the way you like. That is great. Most of the time I do it like that but I am not doing so good. Ron.**

> Dear God. Your book has a lot of zip to it. I like science fiction stories. You had very good ideas and I would like to know where you found them. Your reader Jimmy.[1]

Children in nursery school asked to draw pictures draw rockets with the count down indicated even before they know their numbers in sequence, and put in "7, 5, 4, 2, 1." Children discussing space take up their position out on the moon looking out at the earth, while their parents are still positioned on the earth looking up at the moon, a moon still conceived as they conceived it in childhood and learned to recite:

> "Oh moon have you done something wrong in heaven
> That God has hidden your face,"

or when they were a little older,

> "If you want to spoon, say please mister moon
> Be a good sport and turn off your light."

And it was only a few years ago in which in a Bell Telephone company special film about the earth's resources, the sun was represented with a grinning face, smiling down on earth men trying to do mathematical calculations. The film was called Mister Sun!

The pre-war generation grew up trained to "concentrate", to work in quiet libraries where people were punished for talking, to finish their lessons before they played records or turned on the radio. The post war generation has learned to read and study and think with several media going at once, TV showing a game with the sound turned off, the radio turned on to a radio commentator on the same game, a long playing record providing background music, as 9th graders, glued to the telephone, compare notes on the problems they are doing. Reading

required concentration; the symbols on the page were such a fragmentary schematic part of the vast information that they conveyed, simple sentences invoked whole epochs of history, as "Rome fell," and "America was discovered." Children who learned primarily from books had to learn to concentrate on the whole evocative sequence that unrolled in orderly and linear fashion before them. Understandably, the better scholar one became, the less related one was likely to be to ongoing life. But today's children not only can deal in many media but find silence, especially silence in a group, something that is very hard to bear. Shut up for the first time in a strictly policed room to take a scholarship exam, they quail before the sounds of their own and their neighbor's rumbling stomachs, sounds that they have never heard before, in the noise ridden world that they inhabit by choice. Educated adults still "watch" TV, organize themselves in comfortable chairs, and turn attentively towards the TV screen as if they were at a concert where coughing and sneezing were forbidden. Uneducated adults may sit glued to the screen. But today's children simply turn it on and keep an eye on it, as one might keep an eye on what is going on out in the street, while making up one's mind whether to go out and join one of a number of games. It's a window on the world. Sometimes there is something very special, as a parade is a special variant of street life and one may fight for standing room, but in general it's part of life to which one can attend for hours at a time, or treat cavalierly as part of the scenery.

An instructive example of the failure of teachers to allow for the TV world has been the conclusions that were drawn about children from socially

deprived backgrounds who were voted "unable to concentrate." But if the teacher to whose voice they do not listen is put on closed TV, they sit perfectly quietly, and listen soberly to remarks that are obviously addressed to them, as are the remarks of Captain Kangaroo.

> Dear God,
>
> If you do all these things you are pretty busy. Now here's my question. When is the best time I can talk to you? I know you are always listening but when will you be listening in Troy, New York? Sincerely yours, Allen.[2]

These children have often grown up in homes where it was not customary for adults to tell anything to children but only to give them orders to keep still or get moving. Where the teacher who expects attention can get no response, the trained expectation of something said directly to them which they want to hear, is available to start these small children listening and learning.

In one very instructive case, we have an instance of a little girl who learned to read from TV without anyone knowing she had. It took an agonizing year in first grade where she was pronounced mentally defective and three years in a special psychiatric residential institution to get her back into the mainstream of education. Yet this is only an extreme example of the way in which bright children who have learned from **not only content but process of the mass media** are crippled by the discrepancy between what they know and what their teachers and parents think they know.

At the 1968 Congress of the World Federation for Mental Health, Dr. Margaret Lowenfeld presented the case of a boy who was having great difficulty learning to read by standard methods, but who could already solve problems

of many dimensions in his head, doing quickly what highly trained adults took three or four times as long to do.[3]

The school as it was invented in societies in Phase Two, of the phase of Education for Maintenance and Slow Change, was conceived as a group situation in which the teacher could teach a large class, in unison, and the slow child was dragged along, the brighter child's learning ability modulated to the pace of the class, the multiple styles of learning of the different children in the group, combined in such a way that finally, all the children in the class learned to read and write and do a modest amount of figuring. The slow pace, the group recitation, the teacher's rebukes and encouragements to children with different sensory gifts, combined to provide an atmosphere almost as embracing as a primitive village where all the little boys learned to shoot bows and arrows or handle a harpoon. As long as change - in society and in methods of teaching was slow enough - this worked. All of the children who were not seriously mentally defective learned to read, and the bright child read ahead of the class and was not severely damaged.

But since the advent of many other media beside script, rapid, partly rationalized untested methods of education which change with great speed so that teachers teach in ways of which they have no previous learning knowledge, this system has broken down. Great numbers of children fail to learn to read, very bright children are severely damaged, children who come from backgrounds divergent from the assumed background for school children, break down before they are given a chance to adjust. The method of class instruction in which

the appeals to special abilities and the use of special sensory modalities were masked by a slow, well tried approach no longer obtains. Moving with the group is only satisfactory when the teacher has moved in the same way and so transforms their difficulties and capabilities into something that can be mastered by another generation doing the same thing.

This seems to me to be a more satisfactory explanation of the lack of reading difficulties in Japan and Korea than the alternative suggestions that we have a much larger number of children with defects in vision, e.g., lack of binocular vision, and with learning defects due to new forms of malnutrition associated with synthetic diets of various sorts. A case can, however, be made, as Milton Tobias has shown in his studies of California children,[4] that maturational delay, temporary and correctable central nervous system difficulties, and ocular defects also play a considerable role. It must also be borne in mind that where our aim is to save even the most fragile infant, both new defects and new capabilities in individuals of types who in the past would never have survived infancy, may be expected to appear in our school population to challenge our educational technology.

In this connection it is worthwhile considering the kinds of educational ingenuity developed by Evelyn Ayrault,[5] herself a case of cerebral palsy, who has specialized in testing and teaching devices for severely handicapped children, and the recent efforts to compensate for the defects in the Thalidomide babies, and the experiments with placing hearing aids on very young infants, and so improving their use of their defective hearing that later they can dispense with the hearing aids.

The Russians have been exceedingly successful in teaching the deaf by combining the use of manual language, lip reading and typewriters so that children enter the first year of school with well-developed, large vocabularies.

All of these devices for teaching the deaf, the **blind, the crippled, those with birth injuries or cerebral palsy, where a great deal of technical imagination has** been expended because of the extremity of the need, should be re-examined to see how they can be adapted to solve the learning problems of less handicapped but severely one-sided children. Intensive listening **through special earphones** may strengthen a child whose hearing is dull and obtuse; intensive watching of specially constructed closed**-circuit TV may teach a child with tunnel vision to** allow for his defect, or a child with very wide vision to narrow it and focus more centrally.

Furthermore, such technical devices can be organized to teach children how other people see the world. There have been instructive museum exhibits of a "dog's eye view of the world" and of the way in which monkeys or birds see the world. An essential for children who are going to grow up in a multi-media world is to realize where their own sight, and hearing, and ability to use abstract symbols and respond to isolated stimuli or complicated patterns, stand in the spectrum of the human abilities manifested now by fellow pupils and later by friends, constituents, fellow workers, fellow team members, audiences, etc. Each step in which a child's consciousness of his special skills and special "blind spots" (using this term to cover **defects in any aspect of** perception) is developed, will be a step towards developing an effective citizen of the emerging world. Glasses in which children can experiment

with near-sightedness and far-sightedness, binoculars, microscopes, and telescopes should be part of the regular equipment for young children and not wait for the time when they are studying a laboratory science or beginning to take a serious interest in astronomy. The electronic microscope, and telescope, and surgical instrument for operations, are already part of their world as seen on TV. Children need a chance to try them out.

Today's teachers will be increasingly called upon to teach in fields where they lack both childhood experience and contemporary knowledge and where many of the children in the class, who have been attending to the mass media, are more knowledgeable than they. Faced with this condition, we have several options. We can try to re-educate the teachers, to simulate the experience of learning as a child by a condensed experience of learning as an adult.

This process of placing today's adult teachers in the position of children who learn new things has been experimented with in various ways. Some brilliant young foreign students, when they go to a new country, spend considerable time associating with younger people so as to capture the steps by which their age mates reached their present position as college students or medical students. The field anthropologist does the same thing in learning a new language, simultaneously associating with young children, and learning as the children learn, and using highly abstract linguistic techniques to approach the language analytically. One experiment in which teachers were gathered together for new learning, using films to give them a further understanding of the process, was carried out by Gertrude Hendrix at the

University of Illinois Mathematical program in which teachers were taught themselves, saw children taught, and also were given films of the way in which young dogs learned in a few short weeks from experienced trainers. How much the original period of learning, as one learns a mother tongue, can be simulated by the use of a variety of film and sound tape learning devices, remains to be seen. But it is one device open to us. Experiments in the special classes in the Illinois project suggested, however, that it was easier to teach teachers who had taught but had never taught **mathematics** how to teach the new mathematics than it was to teach mathematics teachers who had learned previous techniques. This suggests that unlearning specific **skills may be a more** serious barrier to learning new skills **than earlier** more generalized learning. Experience with trying to present new experiences in which there is no trace of old habits also suggests that in planning the re-education of teachers less reliance can be placed on any situation where unlearning is required.[7]

The experiments in making instructional films for the teaching of **mathematics** made at the University of Illinois project, are also illuminating. The construction of the films themselves, in which the same teacher taught two sections, a week apart, so that the film makers could learn which moments to concentrate on, was a magnificent innovation. But the cost of the films, although subsidized, has been prohibitive and **has prevented adequate** dissemination of both the method of teaching and the method of making teaching films.*

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* Teaching Highschool Mathematics First Course. 50 Films for Teachers of Elementary Algebra. Produced by The University of Illinois, Committee on School Mathematics, with an Introduction to the UICSM Teacher Training Films by Gertrude Hendrix. Average purchase price for each film $170.00, total purchase price for 50 films $8400.00. Rental rate $6.00 each film for 3 school days, $12.00 for each film for 8 school days.

The librarian presents another model by which teachers themselves unfamiliar with the subject matter or point of view which they must now teach can nevertheless present it to their pupils in audio-visual forms. Librarians are taught to know about things and to guide those who want to use the library into realms with which they themselves are totally unfamiliar. Far from being ashamed of their specific ignorance they are proud of their capacity to deal with the unfamiliar. If suitable films and tapes are available and are constructed for the use of teachers who are themselves unfamiliar with the subject matter, packaged in a way which makes the teacher proud of exploration rather than ashamed of ignorance, this **library model** can be used very constructively. But any film or tape which assumes that the teacher has, may have, or should have, a kind of contemporary knowledge which she does not have, leads to antagonism **toward the new material - and to** the new media - and to a tendency to clamp down on pupils'discussion as too threatening. This undoubtedly is one of the reasons for the tremendous antagonism and faulty use of audio-visual materials. Those who have made the materials have wanted to provide a content which will compensate for what the teacher does not know, but they do not make any allowance for the way in which his or her lack of knowledge is presented to the teacher so as to prevent the feeling of humiliation which stems from the conception of a teacher who knows what the pupils do not know. Today the teacher must adjust to being guide and **counselor** and fellow explorer into realms in which he not only does not know more than the pupils but often knows less.

The hostility to the use of audio-visual aids, and this extends to programmed learning, use of computers, and every sort of teaching aid which

has a mechanical component, even such mundane instruments as typewriters **and stop watches is** also partly a function of the different ways in which the two sexes deal with machines. Traditionally women have disliked and distrusted machinery while boys and men have in the majority of cases learned to enjoy it. All mechanical teaching aids are designed by men and implicitly set up to be used by men. Projectors are **made too heavy for women to manage. Much of** the equipment is unreliable and requires continuous **monkeying-with and adjustment.** Visual aid departments have also been manned by men.

If the new technology is to be used constructively in the school, women who form and may be expected to continue to form the majority of our instructional personnel through high school at least, must be included in the planning. Machinery must be devised which can be used with a minimum of adjustment, and educational instructional materials adapted to the style of relatively fool-proof equipment designed for feminine use - e.g., washing machines - instead of to the style of ingenious small boys who like making things that don't work, work. Women - their whole attention concentrated on the pupils in front of them - like things that do work, not things that have to be made to work. Not only is it necessary to take women into the designing stage for equipment and audio-visual content, because they will be constituting the majority of those who use it, but it is also essential to include children, at as early an age as possible. Only children know what children see and what children are learning on daily TV; only children know what automatically conveys the message - This is an ad; don't watch. This is an ad, don't listen." The creators of the ads continually resort to new tricks

of presentation, voice change, altered sequence, in an attempt to divert, amuse and cajole an adult audience who are resistant to any style they know. But meanwhile, the children are absorbing another set of messages at another level, and a beautifully conceived sound film may convey exactly the opposite meaning from that which was intended.

By the same token, instructional audio-visual or programmed materials must be constantly renewed. Children are keyed to the smallest clues, from a single shift of line in a comic strip, to a change in the introductory music in a film. If the message is to be fresh and learned, it must also be absolutely contemporary in every respect, OR the datedness must be built in, so that teacher and pupils can laugh together at **how strangely old hat** the ideas of five years ago are, and how much new there will be to learn.

A further characteristic of the present emergent phase of change is that it is no longer easily demonstrable to children and to those who lack education that there is an absolute tie-in between the need to go through the same steps as their predecessors and the arrival at a position of adult competence. Here I think it is essential to bracket together the impatience of children and young people with the whole educational system, the demands of the poor and uneducated for a full share in all the benefits of an industrialized society, and the demands of the new countries for immediate industrialization and effective nationhood. They share the common characteristic of a failure to recognize that the repetition of steps which were once demanded of adults, the poor and the children of the poor, and the inhabitants of the economically backward areas of the world are, in any

sense, relevant today. Parents, teachers, elders - all of those who in the past have commended the necessity and the rewards of appropriate effort to learn needed skills, and the appropriateness of smaller rewards to those who failed to learn - can no longer do so. Why, they, ask should anyone have to go through stages which are so obviously associated with obsolescent skills and ideas? So children fail to learn in school; college students drop out, rebel and demand relevance; the minorities and the uneducated demand immediate shares of our admittedly enormous productive ability; and nations barely born want airlines and atomic reactors. This has been discussed as a demand for "instant" everything by Hayakawa[8] and others. But I do not think this goes to the heart of the matter. The rationale of waiting, studying, learning, or accepting, as an adult, that owing to accident of birth, failure of purpose or lack of ability one must take a humbler place in the social system, has simply collapsed under the speed of change. Parents who attempt to explain are dismissed by children who saw a more comprehensible version on TV; teachers who attempt to teach from obsolescent text books are dismissed as out of date and irrelevant; and the barely literate poor demand the same standard of living as those who have waited and worked, often for several generations, always through childhood and adolescence. It is hard to see what kind of a workable world we can develop unless a new rationale is introduced which makes such orders of discrepancy comprehensible to children, and to those whose present position is the product of previous lack of privilege.

The use of modern technology in education unless used more skillfully than at present simply deepens the generation gap. When a professor lectures

on Plato and the student yawns, the student still knows that the professor knows more about Plato than he does. His only rebellious recourse is to say Plato is irrelevant to his interests and the needs of the contemporary world. But when the teacher shows astounding ignorance both of the content of the new media and the basic technology, then the student can really brush them aside, and, as in the case of the growing segment of youthful radicalism, say their ideas are simply untrustworthy and incapable of managing the system in which they are still in control. It is essential that we recognize the inexperience - in the sense of not having grown up into it - of all adults in the contemporary world, and treat the whole of our present civilization, as understood by the young, as comparable to a second language. This must be learned, if we as adults are to continue to be able to use our mother tongue, and if the children are not to be as radically disinherited as the small survivors of Dachau and Belsen who had to be parents to each other. To make this possible, we have to institute new forms of learning together, in which adults are educated in ways of identifying and using the world as seen through the eyes of children and teenagers - as adults and youngsters work together on problems to which neither group knows the answer. Education has been built upon accumulated past knowledge and experience. It must now include articulate ignorance of the emerging future combined with a determination to master the skills necessary to shape the future for the well-being of mankind.

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